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CLAIMS

We claim:

- 1. A method for inhibiting platelet activation and recruitment in a mammal in need of such treatment comprising administering an effective amount of a soluble CD39 polypeptide having a structure X-Y wherein X is selected from the group consisting of an Ala residue and heterologous peptides capable of adopting a stable secondary structure and Y is selected from the group consisting of:
- (a) polypeptides having an amino acid sequence as set forth in (SEQ ID NO:2) wherein the amino terminus is selected from the group consisting of amino acids 36-44, and the carboxy terminus is selected from the group consisting of amino acids 471-478;
 - (b) fragments of the polypeptides of (a) wherein said fragments have apyrase activity; and
 - (c) variants of the polypeptides of (a) or (b), wherein said variants have apyrase activity.
 - 2. The method of claim I wherein Y is selected from the group consisting of:
- (a) polypeptides having a sequence consisting of amino acids 38-476 or 39-476 of SEQ ID NO:2.
- (b) variant polypeptides that are at least 70% identical in amino acid sequence to amino acids 36 to 478 of SEQ ID NO:2 or to a fragment thereof, wherein said variant polypeptides have apyrase activity.
- (c) variant polypeptides that are at least 80% identical in amino acid sequence to amino acids 36 to 478 of SEQ ID NO:2 or to a fragment thereof, wherein said variant polypeptides have apyrase activity;
- (d) variant polypeptides that are at least 90% identical in amino acid sequence to amino acids 36 to 478 of SEQ ID NO:2 or to a fragment thereof, wherein said variant polypeptides have apyrase activity;
- (e) variant polypeptides that are at least 95% identical in amino acid sequence to amino acids 36 to 478 of SEQ ID NO:2 or to a fragment thereof, wherein said variant polypeptides have apyrase activity;
- (f) variant polypeptides that are at least 98% identical in amino acid sequence to amino acids 36 to 478 of SEQ ID NO:2 or to a fragment thereof, wherein said variant polypeptides have apyrase activity; and
- (g) variant polypeptides that are at least 99% identical in amino acid sequence to amino acids 36 to 478 of SEQ ID NO:2 or to a fragment thereof, wherein said variant polypeptides have apyrase activity.
- 3. The method of claim 1 wherein X is a popule fragment from the amino terminal portion of mature IL-2, CD39-L2, CD39-L3, or CD39-L4.

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- 4. The method of claim 1 comprising administering a polypeptide having the structure A-B-Y wherein A is 0-20 amino acids from the amino terminal portion of mature IL-2 and B is a linker of 0-15 amino acids.
- 5. A method of inhibiting platelet activation and recruitment in a manimal in need of such treatment comprising administering an effective amount of a soluble CD39 polypeptide selected from the group consisting of:
- (a) SEQ ID NO: 6, amino acids 25-464 of SEQ ID NO:27, amino acids 25-474 of SEQ ID NO:28, amino acids 27-473 of SEQ ID NO:29, amino acids 21-476 of SEQ ID NO:3, amino acids 21-476 of SEQ ID NO:4, or amino acids 21-463 of SEQ ID NO:30; and
- (b) fusion polypeptides comprising the polypeptides of (a), wherein said fusion polypeptides have apyrase activity.
- 6. The method of claim 5 wherein the soluble CD39 polypeptide has an amino acid sequence selected from the group consisting of SEQ ID NO: 6, amino acids 25-464 of SEQ ID NO:27, amino acids 25-474 of SEQ ID NO:28, amino acids 27-473 of SEQ ID NO:29, amino acids 21-476 of SEQ ID NO:3, amino acids 21-476 of SEQ ID NO:4, and amino acids 21-463 of SEQ ID NO:30.
- 7. The method of claim 6 wherein the soluble CD39 polypeptide has the sequence of amino acids 21-463 of SEQ ID NO: 30.
- 8. A method according to one of claims 1-7 wherein the soluble CD39 polypeptide has been produced by culturing a recombinant cell that encodes the soluble CD39 polypeptide under conditions permitting expression of the CD39 polypeptide, and recovering the expressed CD39 polypeptide.
- 9. The method of claim 8 wherein the recombinant cell comprises a nucleic acid having a sequence selected from the group consisting of.
 - (a) SEQ ID NO:5; and
- (b) DNA sequences which, due to degeneracy of the genetic code, encode the polypeptide encoded by SEQ ID NO:5.





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- 10. The method of claim 8 wherein the recombinant cell comprises a nucleic acid having a sequence selected from the group consisting of:
 - (a) SEQ ID NO:7; and
- (b) DNA sequences which, due to degeneracy of the genetic code, encode the polypeptide encoded by SEQ ID NO.7.
- 11. The method of one of claims 1-10 wherein the soluble CD39 polypeptide is administered in a composition comprising a pharmaceutically acceptable captier.
- 12. The method of one of claims 1-II wherein the soluble CD39 polypeptide is administered in combination with at least one other antithrombotic or antiplatelet composition.
- 13. The method of claim 12 wherein the soluble CD39 polypeptide is administered in combination with aspirin.
- 14. The method of one of claims 1/13 wherein the soluble CD39 polypeptide is administered parenterally.
- 15. The method of claim /4 wherein the soluble CD39 polypeptide is administered intravenously.
- 16. The method of one of claims 1-15 wherein the mammal is suffering from unstable angina, myocardial infarction, stroke, coronary artery disease or injury, myocardial infarction, atherosclerosis, peripheral vascular occlusion, preeclampsia, embolism, a platelet-associated ischemic disorder including lung ischemia, coronary ischemia, and cerebral ischemia, a thrombotic disorder including coronary artery thrombosis, cerebral artery thrombosis, intracardiac thrombosis, peripheral artery thrombosis, venous thrombosis, thrombosis and coagulopathy associated with exposure to a foreign or injured tissue surface, deep venous thrombosis (DVT), pulmonary embolism (PE), transient ischemic attack (DAs), or another related condition where vascular occlusion is the common underlying feature.
- 17. The method of one of claims 1-15 wherein the soluble CD39 is administered to prevent thrombus formation or reformation, occlusion, reocclusion, stenosis, or restenosis of blood vessels, or stroke.

18. The method of on of claims I-15 wherein the soluble CD39 is administered in conjunction with angioplasty, carotid endarterectory, anastomosis of vascular graft, atherectomy, stent placement, placement of a chronic cardiovascular device such as an in-dwelling catheter or prosthetic valve or vessel, or bypass surgery.

- 19. A method for degrading nucleoside tri- and/or di- phosphates in a mammal in need of such treatment comprising administering an effective amount of a soluble CD39 polypeptide having a structure X-Y wherein X is selected from the group consisting of an Ala residue and heterologous peptides capable of adopting a stable secondary structure and Y is selected from the group consisting of:
- (a) polypeptides having an amino acid sequence as set forth in (SEQ ID NO:2) wherein the amino terminus is selected from the group consisting of amino acids 36-44, and the carboxy terminus is selected from the group consisting of amino acids 471-478;
 - (b) fragments of the polypeptides of (a) wherein said fragments have apyrase activity; and
 - (c) variants of the polypeptides of (a) or (b), wherein said variants have apyrase activity.

